

PROJECT

SOFTWARE CONSTRUCTION AND DEVELOPMENT

SUBMITTED TO:

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BUILDING A QUIZ APPLICATION USING SPRING BOOT



Project

☐ Gradle - Groovy

☐ Gradle - Kotlin

☒ Maven

Language

☒ Java

☐ Kotlin

☐ Groovy

Spring Boot

☐ 3.3.0 (SNAPSHOT)

☐ 3.2.2 (SNAPSHOT)

☒ 3.2.1

☐ 3.1.8 (SNAPSHOT)

☐ 3.1.7

Project Metadata

Group

Artifact

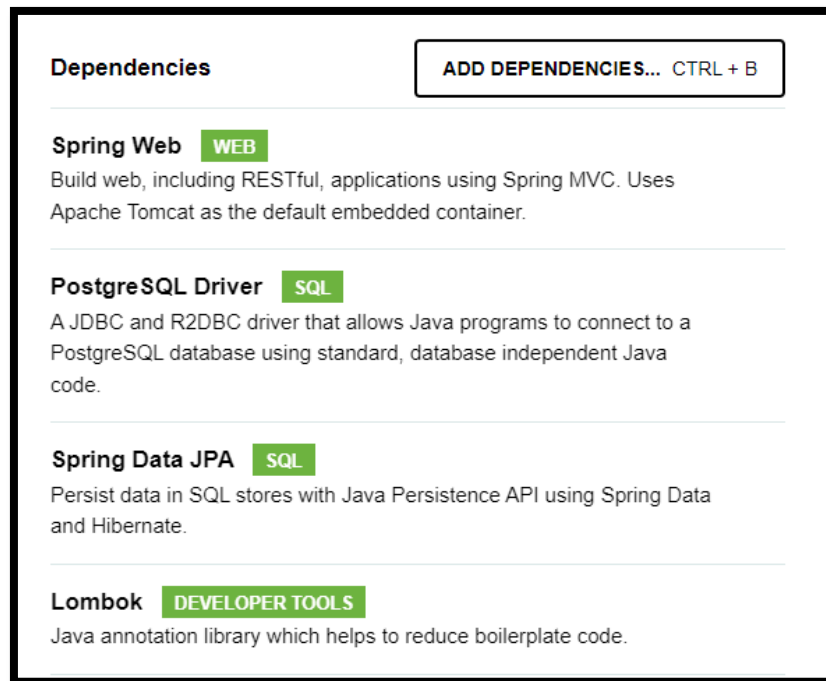
Name

Description

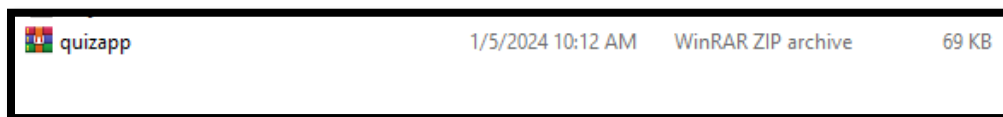
Package name

Packaging ☒ Jar ☐ War

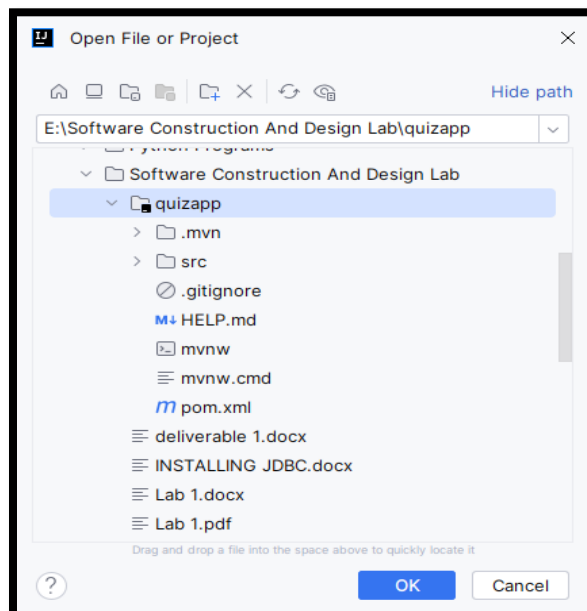
Java ☐ 21 ☒ 17



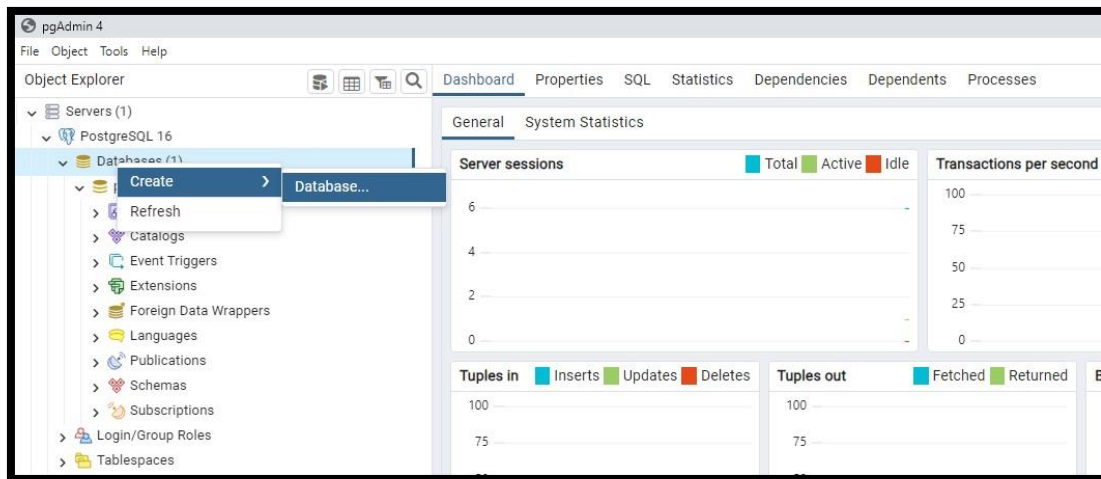
Then we will click on generate and it will create a project and then we have to unzip the project:



Create a REST controller to handle requests for all questions:



- CREATE A NEW DATABASE IN PG ADMIN 4:

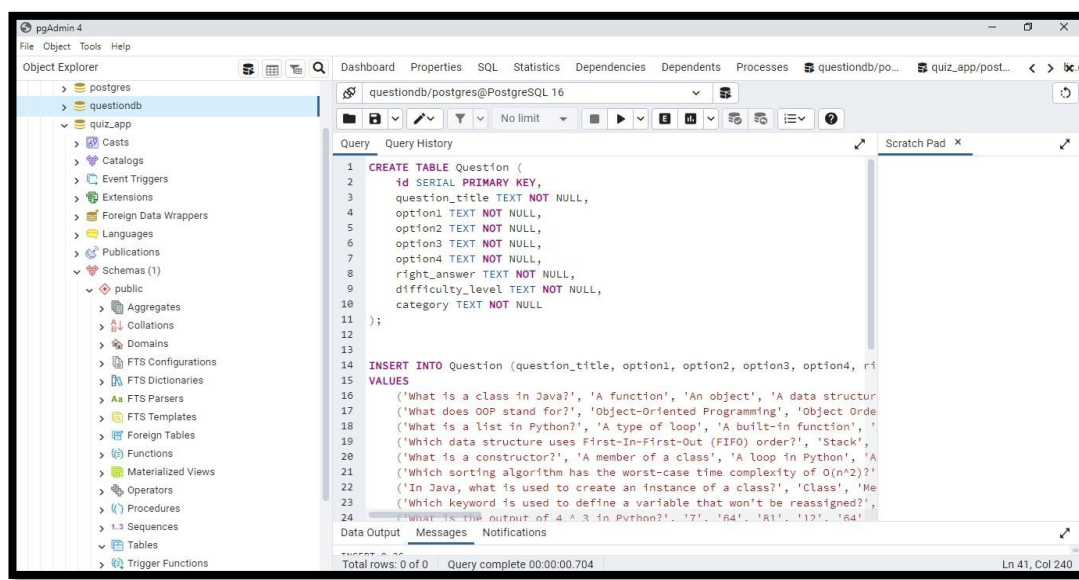


```

1  -- Database: questiondb
2
3  -- DROP DATABASE IF EXISTS questiondb;
4
5  CREATE DATABASE questiondb
6      WITH
7      OWNER = postgres
8      ENCODING = 'UTF8'
9      LC_COLLATE = 'English_United States.1252'
10     LC_CTYPE = 'English_United States.1252'
11     LOCALE_PROVIDER = 'libc'
12     TABLESPACE = pg_default
13     CONNECTION LIMIT = -1
14     IS_TEMPLATE = False;

```

• CREATING TABLES AND INSERTING:



Data Output
Messages
Notifications

CREATE TABLE

Query returned successfully in 866 msec.

• SHOW DATA:

Query
Query History

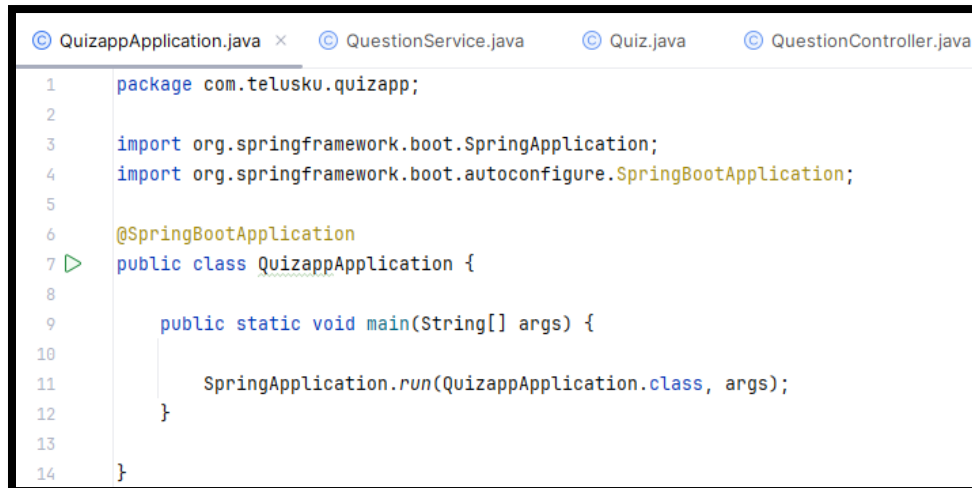
1 SELECT * FROM public.question
2 ORDER BY id ASC

	id [PK] integer	question_title text	option1 text	option2 text
1	1	What is a class in Java?	A function	An object
2	2	What does OOP stand for?	Object-Oriented Programming	Object Ordering Process
3	3	What is a list in Python?	A type of loop	A built-in function
4	4	Which data structure uses First-In-First-Out (FIFO) order?	Stack	Queue
5	5	What is a constructor?	A member of a class	A loop in Python
6	6	Which sorting algorithm has the worst-case time complexity of $O(n^2)$?	Merge Sort	Quick Sort
7	7	In Java, what is used to create an instance of a class?	Class	Method
8	8	Which keyword is used to define a variable that won't be reassigned?	static	final
9	9	What is the output of $4 \wedge 3$ in Python?	7	64
10	10	What does the term "polymorphism" refer to in programming?	Using multiple inheritance	Ability to take multiple forms
11	11	What is the purpose of the 'self' parameter in Python class methods?	It refers to the current instance of the class	It is used to call parent class methods
12	12	Which of the following is not a primitive data type in Java?	int	boolean
13	13	What is the time complexity of a binary search?	$O(n)$	$O(\log n)$

• CONNECTION WITH DATABASE:

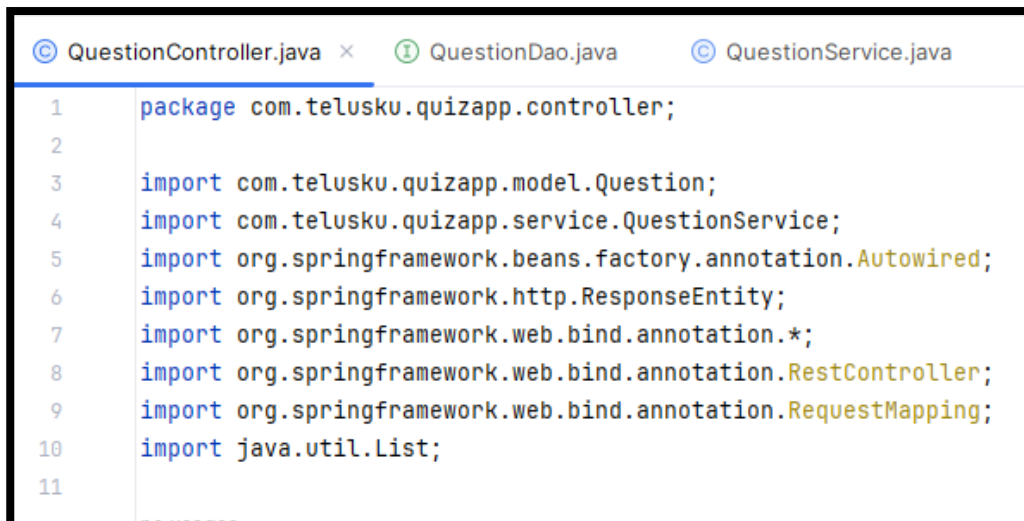
1 spring.datasource.driver-class-name=org.postgresql.Driver
2 spring.datasource.url=jdbc:postgresql://localhost:5432/questiondb
3 spring.datasource.username=postgres
4 spring.datasource.password=bisma
5 spring.jpa.hibernate.ddl-auto=update
6 spring.jpa.properties.hibernate.dialect=org.hibernate.dialect.PostgreSQLDialect
7 spring.jpa.show-sql=true
8

- **CREATING QUIZ APP APPLICATION:**



```
1 package com.telusku.quizapp;
2
3 import org.springframework.boot.SpringApplication;
4 import org.springframework.boot.autoconfigure.SpringBootApplication;
5
6 @SpringBootApplication
7 public class QuizappApplication {
8
9     public static void main(String[] args) {
10
11         SpringApplication.run(QuizappApplication.class, args);
12     }
13
14 }
```

- **GET ALL QUESTIONS:**



```
1 package com.telusku.quizapp.controller;
2
3 import com.telusku.quizapp.model.Question;
4 import com.telusku.quizapp.service.QuestionService;
5 import org.springframework.beans.factory.annotation.Autowired;
6 import org.springframework.http.ResponseEntity;
7 import org.springframework.web.bind.annotation.*;
8 import org.springframework.web.bind.annotation.RestController;
9 import org.springframework.web.bind.annotation.RequestMapping;
10 import java.util.List;
11
```


© QuestionService.java × ⓘ QuestionDao.java © Quiz.java

```
13  @Service
14  public class QuestionService {
    4 usages
15      @Autowired
16      QuestionDao questionDao;
17
    1 usage
18      public ResponseEntity<List<Question>> getAllQuestions() {
19          try {
20              return new ResponseEntity<>(questionDao.findAll(), HttpStatus.OK);
21          } catch (Exception e) {
22              e.printStackTrace();
23          }
24          return new ResponseEntity<>(new ArrayList<>(), HttpStatus.BAD_REQUEST);
25      }
26  }
```

```
13  @Service
14  public class QuestionService {
    4 usages
15      @Autowired
16      QuestionDao questionDao;
17
    1 usage
18      public ResponseEntity<List<Question>> getAllQuestions() {
19          try {
20              return new ResponseEntity<>(questionDao.findAll(), HttpStatus.OK);
21          } catch (Exception e) {
22              e.printStackTrace();
23          }
24          return new ResponseEntity<>(new ArrayList<>(), HttpStatus.BAD_REQUEST);
25      }
26  }
```

```
[[{"id":1,"questionTitle":"What is a class in Java?","option1":"A function","option2":"An object","option3":"A data structure","option4":"A loop","rightAnswer":"An object","difficultyLevel":null,"category":"java"}, {"id":2,"questionTitle":"What does OOP stand for?","option1":"Object-Oriented Programming","option2":"Object Ordering Process","option3":"Operating Overloaded Pointers","option4":"Order of Operations","rightAnswer":"Object-Oriented Programming","difficultyLevel":null,"category":"java"}, {"id":3,"questionTitle":"What is a list in Python?","option1":"A type of loop","option2":"A built-in function","option3":"A data structure","option4":"An object","rightAnswer":"A data structure","difficultyLevel":null,"category":"python"}, {"id":4,"questionTitle":"Which data structure uses First-In-First-Out (FIFO) order?","option1":"Stack","option2":"Queue","option3":"Array","option4":"LinkedList","rightAnswer":"Queue","difficultyLevel":null,"category":"python"}, {"id":5,"questionTitle":"What is a constructor?","option1":"A member of a class","option2":"A loop in Python","option3":"A data type","option4":"A special method","rightAnswer":"A special method","difficultyLevel":null,"category":"python"}, {"id":6,"questionTitle":"Which sorting algorithm has the worst-case time complexity of O(n^2)?","option1":"Merge Sort","option2":"Quick Sort","option3":"Insertion Sort","option4":"Bubble Sort","rightAnswer":"Bubble Sort","difficultyLevel":null,"category":"python"}, {"id":7,"questionTitle":"In Java, what is used to create an instance of a class?","option1":"Class","option2":"Method","option3":"Object","option4":"Constructor","rightAnswer":"Constructor","difficultyLevel":null,"category":"java"}, {"id":8,"questionTitle":"Which keyword is used to define a variable that won't be reassigned?","option1":"static","option2":"final","option3":"constant","option4":"immutable","rightAnswer":"final","difficultyLevel":null,"category":"java"}, {"id":9,"questionTitle":"What is the output of 4 ^ 3 in Python?","option1":"7","option2":"64","option3":"81","option4":"12","rightAnswer":"64","difficultyLevel":null,"category":"python"}, {"id":10,"questionTitle":"What does the term 'polymorphism' refer to in programming?","option1":"Using multiple inheritance","option2":"Ability to take multiple forms","option3":"Manipulating data","option4":"Using multiple programming languages","rightAnswer":"Ability to take multiple forms","difficultyLevel":null,"category":"java"}, {"id":11,"questionTitle":"What is the purpose of the 'self' parameter in Python class methods?","option1":"It refers to the current instance of the class","option2":"It is used to call parent class methods","option3":"It is a keyword for loops","option4":"It is a data type","rightAnswer":"It refers to the current instance of the class","difficultyLevel":null,"category":"python"}, {"id":12,"questionTitle":"Which of the following is not a primitive data type in Java?","option1":"int","option2":"boolean","option3":"char","option4":"string","rightAnswer":"string","difficultyLevel":null,"category":"java"}, {"id":13,"questionTitle":"What is the time complexity of a binary search?","option1":"O(n)","option2":"O(log n)","option3":"O(n^2)","option4":"O(1)","rightAnswer":"O(log n)","difficultyLevel":null,"category":"python"}, {"id":14,"questionTitle":"What keyword is used to inherit a class in Python?","option1":"extends","option2":"inherits","option3":"super","option4":"class","rightAnswer":"class","difficultyLevel":null,"category":"python"}, {"id":15,"questionTitle":"Which type of loop is ideal for situations where the number of iterations is known?","option1":"for loop","option2":"while loop","option3":"do-while loop","option4":"until loop","rightAnswer":"for loop","difficultyLevel":null,"category":"java"}, {"id":16,"questionTitle":"What is the purpose of 'import' in Python?","option1":"To export data","option2":"To create a backup","option3":"To include external modules","option4":"To print output","rightAnswer":"To include external modules","difficultyLevel":null,"category":"python"}, {"id":17,"questionTitle":"In Java, which access modifier provides the widest visibility?","option1":"public","option2":"private","option3":"protected","option4":"package-private","rightAnswer":"public","difficultyLevel":null,"category":"java"}, {"id":18,"questionTitle":"What is a lambda function in Python?","option1":"A function that uses the 'lambda' keyword","option2":"A function with multiple return values","option3":"A function with no parameters","option4":"An anonymous inline function","rightAnswer":"An anonymous inline function","difficultyLevel":null,"category":"python"}, {"id":19,"questionTitle":"What is a linked list?","option1":"A type of array","option2":"A linear data structure","option3":"A collection of objects","option4":"A group of classes","rightAnswer":"A linear data structure","difficultyLevel":null,"category":"java"}, {"id":20,"questionTitle":"Which operator is used to concatenate strings in Python?","option1":"&","option2":"+","option3":"++","option4":"*","rightAnswer":"+","difficultyLevel":null,"category":"python"}, {"id":21,"questionTitle":"What does JVM stand for?","option1":"Java Virtual Machine","option2":"Just Virtual Memory","option3":"JavaScript Virtual Machine","option4":"Java Version Manager","rightAnswer":"Java Virtual Machine","difficultyLevel":null,"category":"java"}, {"id":22,"questionTitle":"In Python, what is the main difference between a tuple and a list?","option1":"Tuples are mutable, lists are not","option2":"Lists are ordered, tuples are not","option3":"Tuples can store mixed data types, lists cannot","option4":"Lists have a fixed size, tuples do not","rightAnswer":"Tuples are mutable, lists are not","difficultyLevel":null,"category":"python"}, {"id":23,"questionTitle":"What is the purpose of the 'finally' block in a try-catch-finally statement?","option1":"To handle exceptions","option2":"To define a fallback value","option3":"To execute code regardless of exceptions","option4":"To terminate the program","rightAnswer":"To execute code regardless of exceptions","difficultyLevel":null,"category":"java"}, {"id":24,"questionTitle":"What is a dictionary in Python?","option1":"A sorted collection of elements","option2":"A data structure used for searching","option3":"An ordered sequence of elements","option4":"A key-value store","rightAnswer":"A key-value store","difficultyLevel":null,"category":"python"}, {"id":25,"questionTitle":"Which keyword is used to define a subclass in Python?","option1":"extends","option2":"inherits","option3":"super","option4":"class","rightAnswer":"class","difficultyLevel":null,"category":"python"}]]
```

• GET QUESTIONS BY CATEGORY:

```
no usages
23 @GetMapping("category/{category}")
24 public ResponseEntity<List<Question>> getQuestionsByCategory(@PathVariable String category)
25 {
26     return questionService.getQuestionsByCategory(category);
27 }
```

```
1 usage
28 public ResponseEntity<List<Question>> getQuestionsByCategory(String category) {
29     try {
30         return new ResponseEntity<> (questionDao.findByCategory(category), HttpStatus.OK);
31     } catch (Exception e) {
32         e.printStackTrace();
33     }
34     return new ResponseEntity<> (new ArrayList<>(), HttpStatus.BAD_REQUEST);
35 }
36
37
```



```
localhost8080/question/category/python

[{"id":3,"questionTitle":"What is a list in Python?","option1":"A type of loop","option2":"A built-in function","option3":"A data structure","option4":"An object","rightAnswer":"A data structure","difficultylevel":null,"category":"python"}, {"id":4,"questionTitle":"Which data structure uses First-In-First-Out (FIFO) order?","option1":"Stack","option2":"Queue","option3":"Array","option4":"LinkedList","rightAnswer":"Queue","difficultylevel":null,"category":"python"}, {"id":6,"questionTitle":"Which sorting algorithm has the worst-case time complexity of O(n^2)?","option1":"Merge Sort","option2":"Quick Sort","option3":"Insertion Sort","option4":"Bubble Sort","rightAnswer":"Bubble Sort","difficultylevel":null,"category":"python"}, {"id":9,"questionTitle":"What is the output of 4 ^ 3 in Python?","option1":"7","option2":"64","option3":"81","option4":"12","rightAnswer":"64","difficultylevel":null,"category":"python"}, {"id":11,"questionTitle":"What is the purpose of the \\self\\ parameter in Python class methods?","option1":"It refers to the current instance of the class","option2":"It is used to call parent class methods","option3":"It is a keyword for loops","option4":"It is a data type","rightAnswer":"It refers to the current instance of the class","difficultylevel":null,"category":"python"}, {"id":13,"questionTitle":"What is the time complexity of a binary search?","option1":"O(n)","option2":"O(log n)","option3":"O(n^2)","option4":"O(1)","rightAnswer":"O(log n)","difficultylevel":null,"category":"python"}, {"id":14,"questionTitle":"What keyword is used to inherit a class in Python?","option1":"extends","option2":"inherits","option3":"super","option4":"class","rightAnswer":"class","difficultylevel":null,"category":"python"}, {"id":16,"questionTitle":"What is the purpose of \\import\\ in Python?","option1":"To export data","option2":"To create a backup","option3":"To include external modules","option4":"To print output","rightAnswer":"To include external modules","difficultylevel":null,"category":"python"}, {"id":18,"questionTitle":"What is a lambda function in Python?","option1":"A function that uses the \\lambda\\ keyword","option2":"A function with multiple return values","option3":"A function with no parameters","option4":"An anonymous inline function","rightAnswer":"An anonymous inline function","difficultylevel":null,"category":"python"}, {"id":20,"questionTitle":"Which operator is used to concatenate strings in Python?","option1":"&","option2":"+","option3":"*","option4":"++","rightAnswer":"+","difficultylevel":null,"category":"python"}, {"id":22,"questionTitle":"In Python, what is the main difference between a tuple and a list?","option1":"Tuples are mutable, lists are not","option2":"Lists are ordered, tuples are not","option3":"Tuples can store mixed data types, lists cannot","option4":"Lists have a fixed size, tuples do not","rightAnswer":"Tuples are mutable, lists are not","difficultylevel":null,"category":"python"}, {"id":24,"questionTitle":"What is a dictionary in Python?","option1":"A sorted collection of elements","option2":"A data structure used for searching","option3":"An ordered sequence of elements","option4":"A key-value store","rightAnswer":"A key-value store","difficultylevel":null,"category":"python"}, {"id":26,"questionTitle":"What is the purpose of the \\pass\\ statement in Python?","option1":"To stop the execution of a loop","option2":"To indicate an empty code block","option3":"To raise an exception","option4":"To terminate the program","rightAnswer":"To indicate an empty code block","difficultylevel":null,"category":"python"}]
```

```
localhost8080/question/category/java

[{"id":1,"questionTitle":"What is a class in Java?","option1":"A function","option2":"An object","option3":"A data structure","option4":"A loop","rightAnswer":"An object","difficultylevel":null,"category":"java"}, {"id":2,"questionTitle":"What does OOP stand for?","option1":"Object-Oriented Programming","option2":"Object Ordering Process","option3":"Operating Overloaded Pointers","option4":"Order of Operations","rightAnswer":"Object-Oriented Programming","difficultylevel":null,"category":"java"}, {"id":5,"questionTitle":"What is a constructor?","option1":"A member of a class","option2":"A loop in Python","option3":"A data type","option4":"A special method","rightAnswer":"A special method","difficultylevel":null,"category":"java"}, {"id":7,"questionTitle":"In Java, what is used to create an instance of a class?","option1":"Class","option2":"Method","option3":"Object","option4":"Constructor","rightAnswer":"Constructor","difficultylevel":null,"category":"java"}, {"id":8,"questionTitle":"Which keyword is used to define a variable that won't be reassigned?","option1":"static","option2":"final","option3":"constant","option4":"immutable","rightAnswer":"final","difficultylevel":null,"category":"java"}, {"id":10,"questionTitle":"What does the term \\polymorphism\\ refer to in programming?","option1":"Using multiple inheritance","option2":"Ability to take multiple forms","option3":"Manipulating data","option4":"Using multiple programming languages","rightAnswer":"Ability to take multiple forms","difficultylevel":null,"category":"java"}, {"id":12,"questionTitle":"Which of the following is not a primitive data type in Java?","option1":"int","option2":"boolean","option3":"char","option4":"string","rightAnswer":"string","difficultylevel":null,"category":"java"}, {"id":15,"questionTitle":"Which type of loop is ideal for situations where the number of iterations is known?","option1":"for loop","option2":"while loop","option3":"do-while loop","option4":"until loop","rightAnswer":"for loop","difficultylevel":null,"category":"java"}, {"id":17,"questionTitle":"In Java, which access modifier provides the widest visibility?","option1":"public","option2":"private","option3":"protected","option4":"package-private","rightAnswer":"public","difficultylevel":null,"category":"java"}, {"id":19,"questionTitle":"What is a linked list?","option1":"A type of array","option2":"A linear data structure","option3":"A collection of objects","option4":"A group of classes","rightAnswer":"A linear data structure","difficultylevel":null,"category":"java"}, {"id":21,"questionTitle":"What does JVM stand for?","option1":"Java Virtual Machine","option2":"Just Virtual Memory","option3":"JavaScript Virtual Machine","option4":"Java Version Manager","rightAnswer":"Java Virtual Machine","difficultylevel":null,"category":"java"}, {"id":23,"questionTitle":"What is the purpose of the \\finally\\ block in a try-catch-finally statement?","option1":"To handle exceptions","option2":"To define a fallback value","option3":"To execute code regardless of exceptions","option4":"To terminate the program","rightAnswer":"To handle exceptions","difficultylevel":null,"category":"java"}, {"id":25,"questionTitle":"Which keyword is used to define a subclass in Java?","option1":"child","option2":"extends","option3":"inherits","option4":"subclass","rightAnswer":"extends","difficultylevel":null,"category":"java"}]
```

Overview GET http://localhost:8080/c + No Environment

http://localhost:8080/question/category/java Save

GET http://localhost:8080/question/category/java Send

Params Authorization Headers (6) Body Pre-request Script Tests Settings Cookies

Headers 6 hidden

Key	Value	Description	...	Bulk Edit	Presets
Key	Value	Description			

Body Cookies Headers (5) Test Results Status: 200 OK Time: 129 ms Size: 3.49 KB Save as example

Pretty Raw Preview Visualize JSON

```

1 [
2   {
3     "id": 1,
4     "questionTitle": "What is a class in Java?",
5     "option1": "A function",
6     "option2": "An object",
7     "option3": "A data structure",
8     "option4": "A loop",
9     "rightAnswer": "An object",
10    "difficultylevel": null,
11    "category": "java"
12  },
13  {
14    "id": 2,
15    "questionTitle": "What does OOP stand for?",
16    "option1": "Object-Oriented Programming",

```

• ADDING QUESTION IN DATABASE:

```

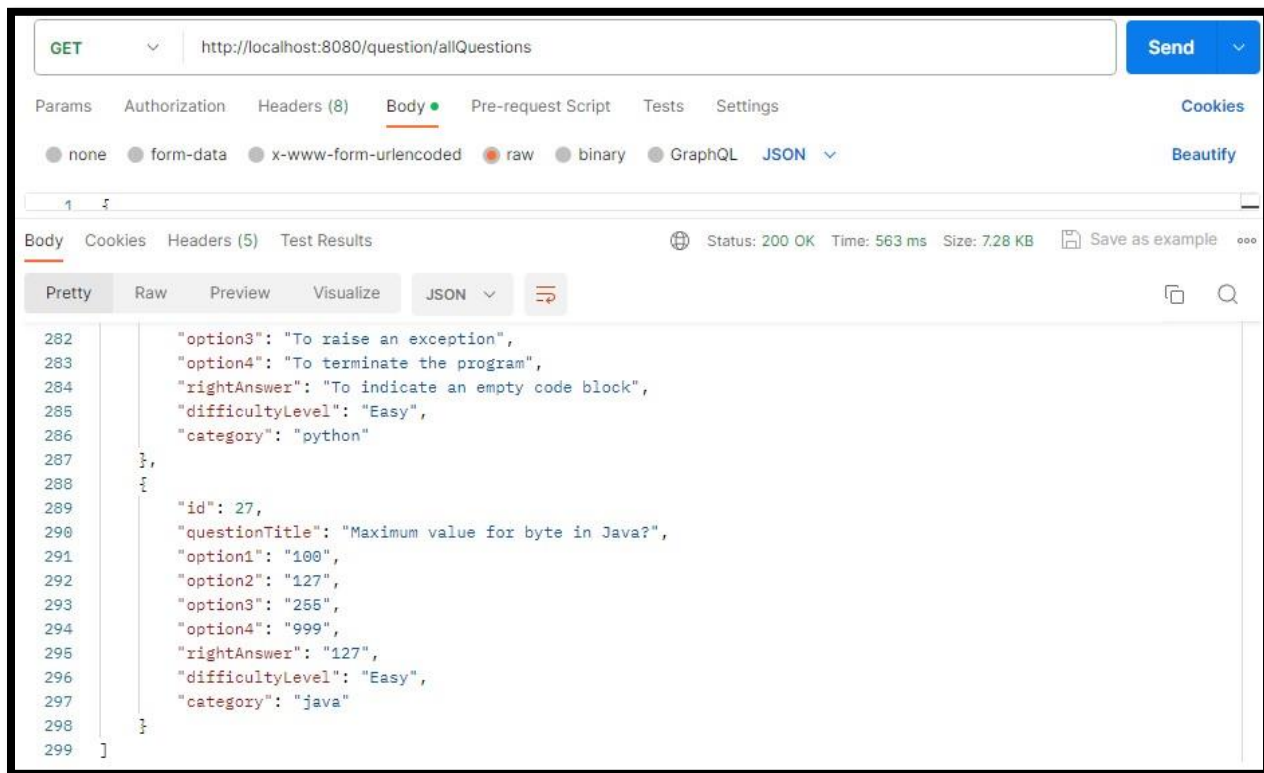
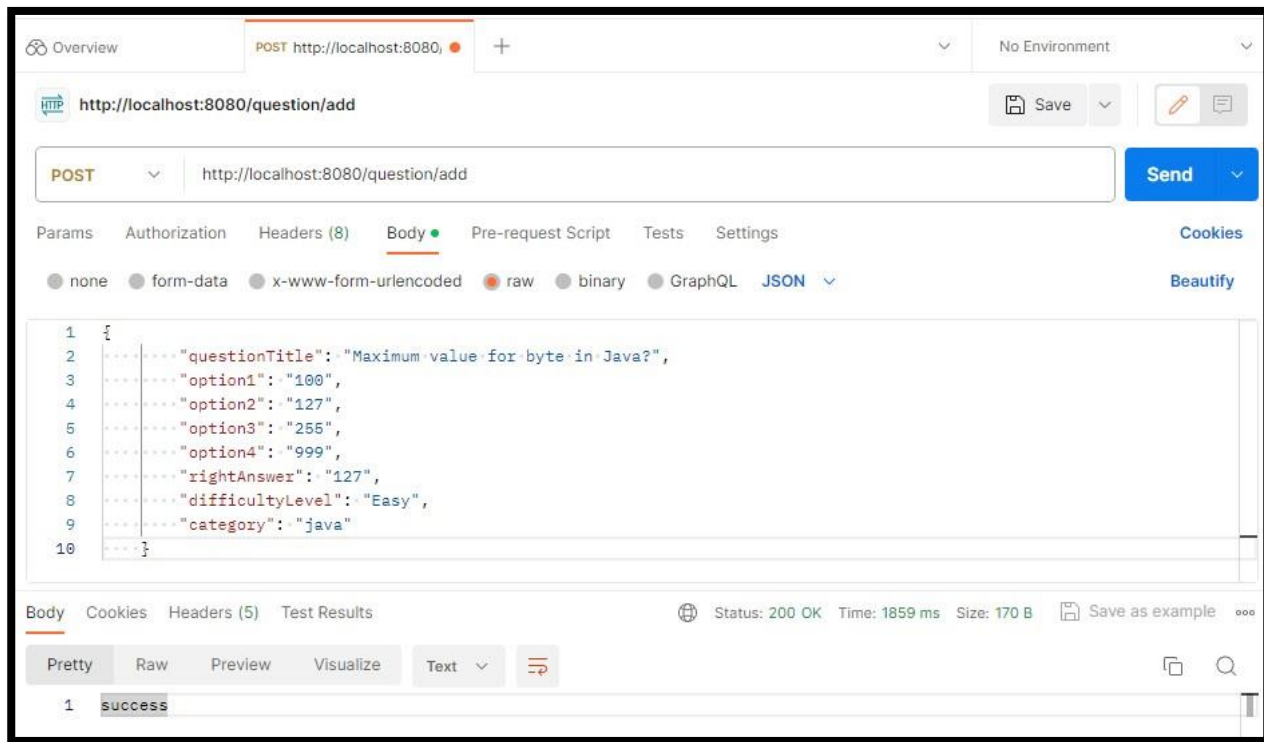
28 @PostMapping("add")
29 public ResponseEntity<String> addQuestion(@RequestBody Question question)
30
31 {
32     return questionService.addQuestion(question);
33 }

```

```

1 usage
38 public ResponseEntity<String> addQuestion(Question question) {
39     questionDao.save(question);
40     return new ResponseEntity<>(body: "success", HttpStatus.CREATED);
41 }
42

```



Question is saved successfully.

- **DELETE QUESTION:**

```

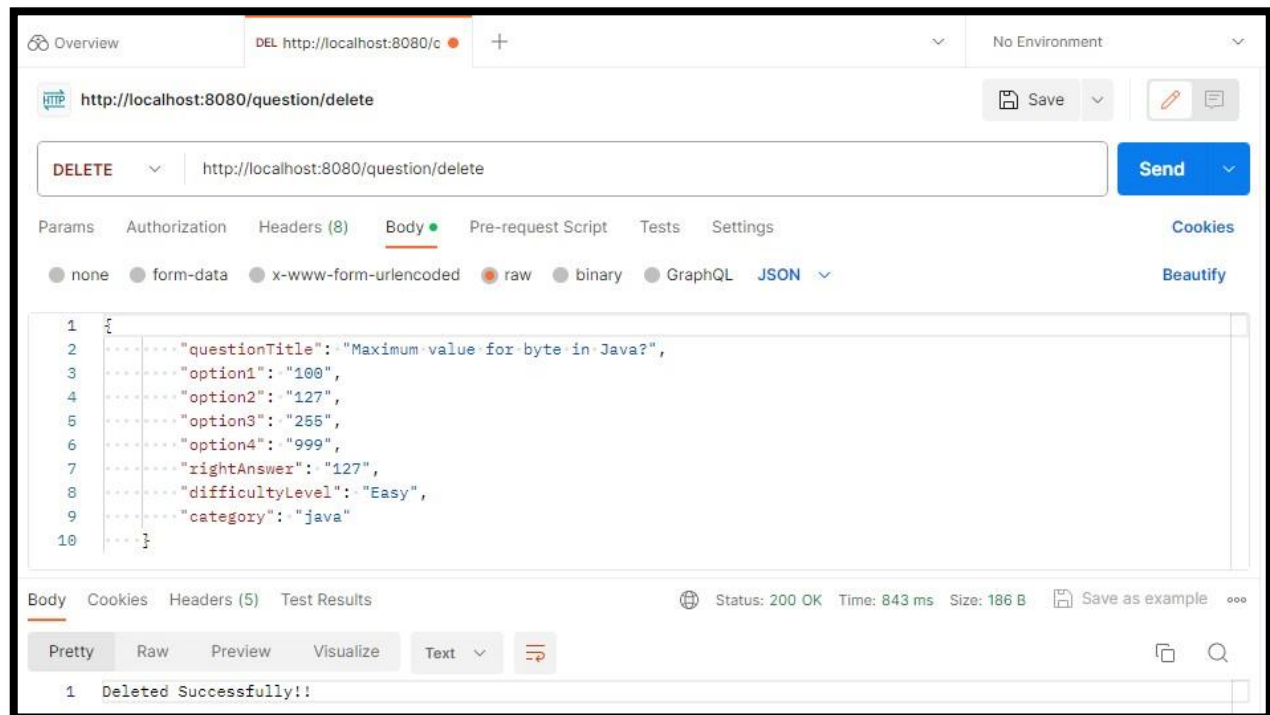
no usages
34 @DeleteMapping("delete")
35 > public String deleteQuestion(@RequestBody Question question) { return questionService.deleteQuestion(question); }
39 }
40 |

```

```

1 usage
43 public String deleteQuestion(Question question) {
44     questionDao.delete(question);
45     return "Deleted Successfully!!";
46 }
47 }

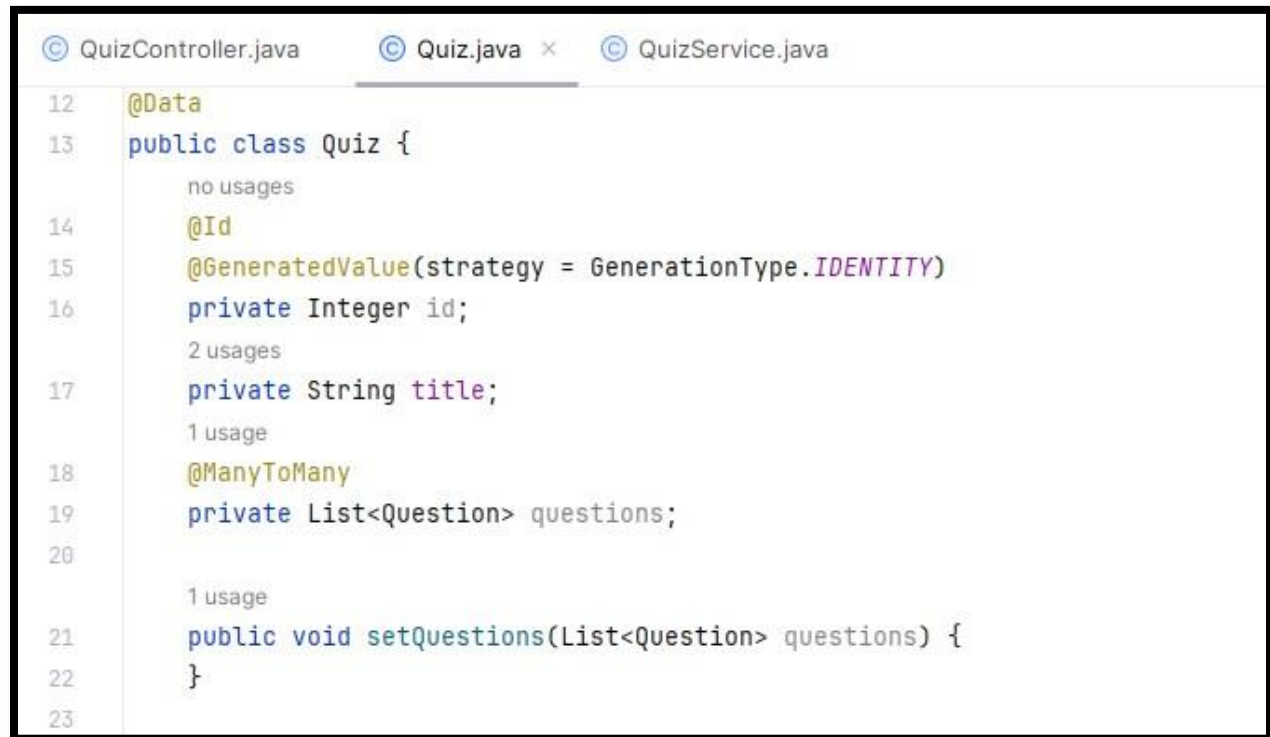
```



- **RESPONSE ENTITY:**



- **CREATE QUIZ:**



QuizController.java QuizService.java x

2 usages

```

18  @Service
19  public class QuizService {
20      3 usages
21      @Autowired
22      QuizDao quizDao;
23      1 usage
24      @Autowired
25      QuestionDao questionDao;
26
27      1 usage
28      public ResponseEntity<String> createQuiz(String category, int numQ, String title) {
29
30          List<Question> questions = questionDao.findRandomQuestionsByCategory(category, numQ);
31
32          Quiz quiz = new Quiz();
33          quiz.setTitle(title);
34          quiz.setQuestions(questions);
35          quizDao.save(quiz);
36
37          return new ResponseEntity<>("Success", HttpStatus.CREATED);
38      }

```

QuizController.java x QuizService.java

no usages

```

13  @RestController
14  @RequestMapping("quiz")
15  public class QuizController {
16      3 usages
17      @Autowired
18      QuizService quizService;
19      no usages
20      @PostMapping("create")
21      public ResponseEntity<String> createQuiz(@RequestParam String category,
22                                              @RequestParam int numQ, @RequestParam String title){
23          return quizService.createQuiz(category, numQ, title);
24      }

```

public.quiz/questiondb/postgres@PostgreSQL 16

Query Query History

```
1 SELECT * FROM public.quiz
2 ORDER BY id ASC
```

Data Output Messages Notifications

	id [PK] integer	title character varying (255)
1	1	JQuiz

public.quiz_questions/questiondb/postgres@PostgreSQL 16

Query Query History

```
1 SELECT * FROM public.quiz_questions
2
```

Data Output Messages Notifications

	quiz_id integer	questions_id integer
1	1	1
2	1	2
3	1	7
4	1	8
5	1	19

- **GET QUIZ:**

QuizController.java

QuizService.java

QuestionWrapper.java ×

```
5  @Data
6  public class QuestionWrapper {
7      1 usage
      private Integer id;
8      1 usage
      private String questionTitle;
9      1 usage
      private String option1, option2;
10     1 usage
      private String option3, option4;
11
12     1 usage
      public QuestionWrapper(Integer id, String questionTitle, String option1,
13                             String option2, String option3, String option4) {
14         this.id = id;
15         this.questionTitle = questionTitle;
16         this.option1 = option1;
17         this.option2 = option2;
18         this.option3 = option3;
19         this.option4 = option4;
20     }
21 }
```

QuizController.java

QuizService.java ×

```
1 usage
37 public ResponseEntity<List<QuestionWrapper>> getQuizQuestions(Integer id) {
38     Optional<Quiz> quiz = quizDao.findById(id);
39     List<Question> questionsFromDB = quiz.get().getQuestions();
40     List<QuestionWrapper> questionsForUser = new ArrayList<>();
41     for(Question q : questionsFromDB){
42         QuestionWrapper qw = new QuestionWrapper(q.getId(), q.getQuestionTitle(),
43             q.getOption1(), q.getOption2(), q.getOption3(), q.getOption4());
44         questionsForUser.add(qw);
45     }
46     return new ResponseEntity<>(questionsForUser, HttpStatus.OK);
47 }
48 }
```

QuizController.java ×

QuizService.java

```
no usages
24 @GetMapping("get/{id}")
25 public ResponseEntity<List<QuestionWrapper>> getQuizQuestions(@PathVariable Integer id){
26
27     return quizService.getQuizQuestions(id);
28 }
```

HTTP Client Interface showing a GET request to `http://localhost:8080/quiz/get/1`.

Query Params:

Key	Value	Description	...	Bulk Edit

Body: Status: 200 OK Time: 584 ms Size: 1.01 KB Save as example

Response Body (JSON):

```
[
  {
    "id": 1,
    "questionTitle": "What is a class in Java?",
    "option1": "A function",
    "option2": "An object",
    "option3": "A data structure",
    "option4": "A loop"
  },
  {
    "id": 2,
    "questionTitle": "What does OOP stand for?",
    "option1": "Object-Oriented Programming",
    "option2": "Object Ordering Process",
    "option3": "Operating Overloaded Pointers",
    "option4": "Order of Operations"
  }
]
```

• SUBMIT QUIZ:

Code Editor showing the `Response.java` file:

```
package com.telusku.quizapp.model;

import lombok.Data;
import lombok.RequiredArgsConstructor;

5 @Data
6 @RequiredArgsConstructor
7 public class Response {
8     private Integer id;
9     private String response;
10    public Object getResponse() { return response; }
13    public void setResponse(String response) { this.response = response; }
16 }
```

```
QuizController.java x QuizService.java
no usages
29 @PostMapping("submit/{id}")
30 public ResponseEntity<Integer> submitQuiz(@PathVariable Integer id, @RequestBody List<Response> responses){
31     return quizService.calculateResult(id, responses);
32 }
33
34 }
```

```
QuizController.java QuizService.java x
1 usage
49 @ public ResponseEntity<Integer> calculateResult(Integer id, List<Response> responses) {
50     Quiz quiz = quizDao.findById(id).get();
51     List<Question> questions = quiz.getQuestions();
52     int right = 0;
53     int i = 0;
54     for (Response response : responses)
55     {
56         if (response.getResponse().equals(questions.get(i).getRightAnswer()))
57             right ++;
58         i++;
59     }
60     return new ResponseEntity<>(right, HttpStatus.OK);
61 }
62 }
```

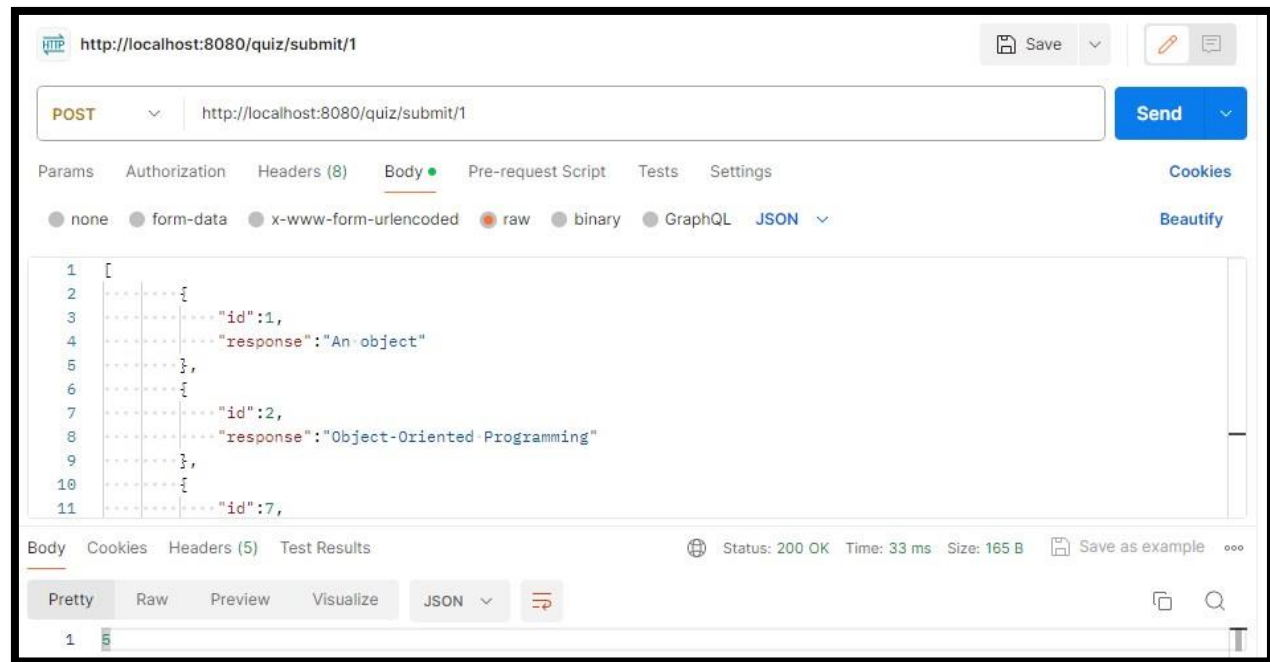
questiondb/postgres@PostgreSQL 16

Query Query History

```
1 select id, right_answer from question
2 where id=1 or id=2 or id=7 or id=8 or id=19
```

Data Output Messages Notifications

	id [PK] integer	right_answer text
1	1	An object
2	2	Object-Oriented Programming
3	7	Constructor
4	8	final
5	19	A linear data structure



- **QUESTION CONTROLLER CLASS:**

```
package com.telusku.quizapp.controller;
```

```
import com.telusku.quizapp.model.Question;
import com.telusku.quizapp.service.QuestionService;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.http.ResponseEntity;
import org.springframework.web.bind.annotation.*;
import org.springframework.web.bind.annotation.RestController;
import org.springframework.web.bind.annotation.RequestMapping;
import java.util.List;
```

```
@RestController
@RequestMapping("/question")
public class QuestionController {
    @Autowired
    QuestionService questionService;
    @GetMapping("/allQuestions")
    public ResponseEntity<List<Question>> getAllQuestions()
    {
        return questionService.getAllQuestions();
    }
    @GetMapping("category/{category}")
    public ResponseEntity<List<Question>> getQuestionsByCategory(@PathVariable String category)
    {
        return questionService.getQuestionsByCategory(category);
    }
    @PostMapping("add")
    public ResponseEntity<String> addQuestion(@RequestBody Question question)
```

```

{
    return questionService.addQuestion(question);
}
@DeleteMapping("delete")
public String deleteQuestion(@RequestBody Question question)
{
    return questionService.deleteQuestion(question);
}
}

```

• Question Class:

```
package com.telusku.quizapp.model;
```

```

import jakarta.persistence.Entity;
import jakarta.persistence.GeneratedValue;
import jakarta.persistence.GenerationType;
import jakarta.persistence.Id;
import lombok.Data;

```

```

@Data
@Entity
public class Question {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Integer id;
    private String questionTitle;
    private String option1;
    private String option2;
    private String option3;
    private String option4;
    private String rightAnswer;
    private String difficultyLevel;
    private String category;

    public Integer getId() {
        return id;
    }

    public void setId(Integer id) {
        this.id = id;
    }

    public String getQuestionTitle() {
        return questionTitle;
    }

    public void setQuestionTitle(String questionTitle) {
        this.questionTitle = questionTitle;
    }

    public String getOption2() {
        return option2;
    }
}

```

```

    }

    public void setOption2(String option2) {
        this.option2 = option2;
    }

    public String getOption3() {
        return option3;
    }

    public void setOption3(String option3) {
        this.option3 = option3;
    }

    public String getOption4() {
        return option4;
    }

    public void setOption4(String option4) {
        this.option4 = option4;
    }

    public String getOption1() {
        return option1;
    }

    public void setOption1(String option1) {
        this.option1 = option1;
    }

    public Object getRightAnswer() {
        return rightAnswer;
    }

    public void setRightAnswer(String rightAnswer) {
        this.rightAnswer = rightAnswer;
    }
}

```

- **QUESTION SERVICE CLASS:**

```

package com.telusku.quizapp.service;

import com.telusku.quizapp.model.Question;
import com.telusku.quizapp.dao.QuestionDao;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.http.HttpStatus;
import org.springframework.http.ResponseEntity;
import org.springframework.stereotype.Service;

import java.util.ArrayList;

```

```

import java.util.List;

@Service
public class QuestionService {
    @Autowired
    QuestionDao questionDao;

    public ResponseEntity<List<Question>> getAllQuestions() {
        try {
            return new ResponseEntity<>(questionDao.findAll(), HttpStatus.OK);
        } catch (Exception e) {
            e.printStackTrace();
        }
        return new ResponseEntity<>(new ArrayList<>(), HttpStatus.BAD_REQUEST);
    }

    public ResponseEntity<List<Question>> getQuestionsByCategory(String category) {
        try {
            return new ResponseEntity<>(questionDao.findByCategory(category), HttpStatus.OK);
        } catch (Exception e) {
            e.printStackTrace();
        }
        return new ResponseEntity<>(new ArrayList<>(), HttpStatus.BAD_REQUEST);
    }

    public ResponseEntity<String> addQuestion(Question question) {
        questionDao.save(question);
        return new ResponseEntity<>("success", HttpStatus.CREATED);
    }

    public String deleteQuestion(Question question) {
        questionDao.delete(question);
        return "Deleted Successfully!!";
    }
}

```

• QUESTION DAO CLASS:

```

package com.telusku.quizapp.dao;
import com.telusku.quizapp.model.Question;
import org.springframework.data.jpa.repository.JpaRepository;
import org.springframework.data.jpa.repository.Query;
import org.springframework.stereotype.Repository;

import java.util.List;

@Repository
public interface QuestionDao extends JpaRepository<Question, Integer> {

```

```
List<Question> findByCategory(String category);
```

```
@Query(value = "SELECT * FROM question q WHERE q.category = :category ORDER BY RANDOM()  
LIMIT :numQ", nativeQuery = true)
```

```
List<Question> findRandomQuestionsByCategory(String category, int numQ);  
}
```

• QUIZ CONTROLLER CLASS:

```
package com.telusku.quizapp.controller;
```

```
import com.telusku.quizapp.model.Question;  
import com.telusku.quizapp.model.QuestionWrapper;  
import com.telusku.quizapp.model.Response;  
import com.telusku.quizapp.service.QuizService;  
import org.springframework.beans.factory.annotation.Autowired;  
import org.springframework.http.ResponseEntity;  
import org.springframework.web.bind.annotation.*;
```

```
import java.util.List;
```

```
@RestController  
@RequestMapping("quiz")  
public class QuizController {  
    @Autowired  
    QuizService quizService;  
    @PostMapping("create")  
    public ResponseEntity<String> createQuiz(@RequestParam String category,  
                                              @RequestParam int numQ, @RequestParam String title){  
        return quizService.createQuiz(category, numQ, title);  
    }  
    @GetMapping("get/{id}")  
    public ResponseEntity<List<QuestionWrapper>> getQuizQuestions(@PathVariable Integer id){  
        return quizService.getQuizQuestions(id);  
    }  
    @PostMapping("submit/{id}")  
    public ResponseEntity<Integer> submitQuiz(@PathVariable Integer id, @RequestBody List<Response>  
responses){  
        return quizService.calculateResult(id, responses);  
    }  
}
```

• QUIZ SERVICE CLASS:

```
package com.telusku.quizapp.service;
```

```
import com.telusku.quizapp.dao.QuestionDao;
```



```

import com.telusku.quizapp.dao.QuizDao;
import com.telusku.quizapp.model.Question;
import com.telusku.quizapp.model.QuestionWrapper;
import com.telusku.quizapp.model.Quiz;
import com.telusku.quizapp.model.Response;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.http.HttpStatus;
import org.springframework.http.ResponseEntity;
import org.springframework.stereotype.Service;

import java.util.ArrayList;
import java.util.List;
import java.util.Optional;

@Service
public class QuizService {
    @Autowired
    QuizDao quizDao;
    @Autowired
    QuestionDao questionDao;

    public ResponseEntity<String> createQuiz(String category, int numQ, String title) {

        List<Question> questions = questionDao.findRandomQuestionsByCategory(category, numQ);

        Quiz quiz = new Quiz();
        quiz.setTitle(title);
        quiz.setQuestions(questions);
        quizDao.save(quiz);

        return new ResponseEntity<>("Success", HttpStatus.CREATED);
    }

    public ResponseEntity<List<QuestionWrapper>> getQuizQuestions(Integer id) {
        Optional<Quiz> quiz = quizDao.findById(id);
        List<Question> questionsFromDB = quiz.get().getQuestions();
        List<QuestionWrapper> questionsForUser = new ArrayList<>();
        for(Question q : questionsFromDB){
            QuestionWrapper qw = new QuestionWrapper(q.getId(), q.getQuestionTitle(), q.getOption1(),
            q.getOption2(), q.getOption3(), q.getOption4());
            questionsForUser.add(qw);
        }
        return new ResponseEntity<>(questionsForUser, HttpStatus.OK);
    }

    public ResponseEntity<Integer> calculateResult(Integer id, List<Response> responses) {
        Quiz quiz = quizDao.findById(id).get();
        List<Question> questions = quiz.getQuestions();
        int right = 0;
        int i = 0;
        for (Response response : responses)

```

```

    {
        if (response.getResponse().equals(questions.get(i).getRightAnswer()))
            right ++;
        i++;
    }
    return new ResponseEntity<>(right, HttpStatus.OK);
}
}

```

• QUIZ CLASS:

```

package com.telusku.quizapp.model;
import jakarta.persistence.Entity;
import jakarta.persistence.GeneratedValue;
import jakarta.persistence.GenerationType;
import jakarta.persistence.Id;
import jakarta.persistence.*;
import lombok.Data;

import java.util.List;

@Entity
@Data
public class Quiz {
    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Integer id;
    private String title;
    @ManyToMany
    private List<Question> questions;

    public void setQuestions(List<Question> questions) {
    }

    public void setTitle(String title) {
        this.title = title;
    }

    public String getTitle() {
        return title;
    }

    public List<Question> getQuestions() {
        return questions;
    }
}

```

• QUIZ DAO CLASS:

```

package com.telusku.quizapp.dao;

```

```
import com.telusku.quizapp.model.Quiz;
import org.springframework.data.jpa.repository.JpaRepository;

public interface QuizDao extends JpaRepository<Quiz, Integer> {
}
```

- **QUESTION WRAPPER CLASS:**

```
package com.telusku.quizapp.model;

import lombok.Data;

@Data
public class QuestionWrapper {
    private Integer id;
    private String questionTitle;
    private String option1, option2;
    private String option3, option4;

    public QuestionWrapper(Integer id, String questionTitle, String option1,
        String option2, String option3, String option4) {
        this.id = id;
        this.questionTitle = questionTitle;
        this.option1 = option1;
        this.option2 = option2;
        this.option3 = option3;
        this.option4 = option4;
    }
}
```

- **RESPONSE CLASS:**

```
package com.telusku.quizapp.model;

import lombok.Data;
import lombok.RequiredArgsConstructor;
@Data
@RequiredArgsConstructor
public class Response {
    private Integer id;
    private String response;
    public Object getResponse() {
        return response;
    }
    public void setResponse(String response) {
        this.response = response;
    }
}
```